

### ABSTRACT

Disclosed is a method for producing cardiomyocytes *in vivo* by administering to the heart of an individual a cardiomyocyte producing amount of mesenchymal stem cells. These cells can be administered as a liquid injectible or  
5 as a preparation of cells in a matrix which is or becomes solid or semi-solid. The cells can be genetically modified to enhance myocardial differentiation and integration. Also disclosed is a method for replacing cells *ex vivo* in a heart valve for implantation.

10